STATE OF IDAHO

FISH AND GAME DEPARTMENT

John R. Woodworth, Director

FEDERAL AID TO FISH RESTORATION

Annual Progress Report

for

Research Project F-51-R

ANDERSON RANCH RESERVOIR - SOUTH FORK OF BOISE RIVER

By

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Boise, Idaho

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TABLE OF CONTENTS

ANDERSON RANCH RESERVOIR INVESTIGATIONS,
by James R. Graban,

List of Figures

JOB NO, 1, 2, and 3. ANDERSON RANCH RESERVOIR INVESTIGATIONS, by James R. Graban,

ABSTRACT

A fishery research project initiated in 1963 was continued during 1964 at Anderson Ranch Reservoir on the South Fork of the Boise River. The objectives of the project are to develop control programs on nongame fish species and to search for environmental conditions that might be limiting the abundance of the game fish species. The various study segments of the project included fish life histories and distribution, limnology, and creel census.

Anderson Ranch Reservoir is a large Bureau of Reclamation irrigation and power development containing 493,000 acre feet of water and is approximately 12 miles in length. The reservoir contained large populations of nongame fish species and sport fishing was generally poor.

Cladocera comprised the bulk of the zooplankters in the reservoir. Daphnia spp. are present in both quantity and quality throughout most of the growing season, Copepods are present in some quantity in May and July,

Stratification began in mid-June and complete stratification was accomplished in mid-July. Surface water temperatures varied throughout the summer months from 53 degrees to 75 degrees Fahrenheit. Bottom water temperatures varied from 39 degrees to 48 degrees Fahrenheit.

Dissolved oxygen levels in Anderson Ranch Reservoir ranged from a mid-summer low of 8,5 ppm to a spring and fall high of 12.6 ppm. Dissolved oxygen concentrations at depths of 200 feet varied from 8 to 10 ppm and remained fairly constant at these levels throughout the summer months.

Fifty-'one percent of the fish taken throughout the summer in gill net samples in the reservoir were squawfish, 27 percent sucker spp., 5 percent chislemouth chub, 13 percent yellow perch, and 4 percent rainbow trout.

Squawfish were observed to spawn along the shoreline in wave-washed rubble areas, on clear calm days. Peak of spawning is in mid or late June with some activity continuing into July. Hoop net samples in tributaries revealed little squawfish movement from the reservoir for spawning purposes. SCUBA gear was utilized to locate, observe, and collect squawfish during the spawning period, -

Limited data on food habits of fish in the reservoir was collected. Examinations of both suckers and squawfish stomachs captured by spear gun indicated that both of these fish fed heavily on zooplankton. Very few trout were captured or observed throughout. the collection period.

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

State of IDAHO

Name ANDERSON RANCH RESERVOIR INVESTIGATIONS

Project No. F 51-R-2

Title South Fork of Boise River Fishery Research Project

Job No. 1, 2, 3

Period Covered: March 1, 1964 to February 28, 1965

RECOMMENDATIONS:

Temperature, dissolved oxygen and zooplankton abundance data indicated that the reservoir environment was suitable for salmonids. Efforts should be intensified to increase production of salmonid species.

The possibility of controlling the squawfish populations by chemical treatment of shoreline spawning areas at the time of fry emergence should be explored. It is believed that because of the limited swimming ability of these fry, concentration of the fry in shallow shoreline areas, and the relatively small water volume to be treated that a substantial number of the fry could be killed each year.

OBJECTIVES:

The objectives of the 1964 Anderson Ranch Reservoir Investigations were to:

1. To determine the pattern of water level fluctuations, water temperatures, dissolved oxygen concentrations, and zooplankton abundance in the reservoir and its tributaries.

2. To determine the relative abundance, distribution, age and growth, spawning habits, and food habits of various game and nongame species in the reservoir and tributary streams.

3. To determine the species composition of the angler harvest and determine the contribution of planted trout to the creel.

TECHNIQUES USED:

Bimonthly limnological information was taken at two stations in the reservoir. One station located in the forbay of the dam and another at mid-reservoir approximately 6.5 miles up reservoir from the dam (Figure 1). At

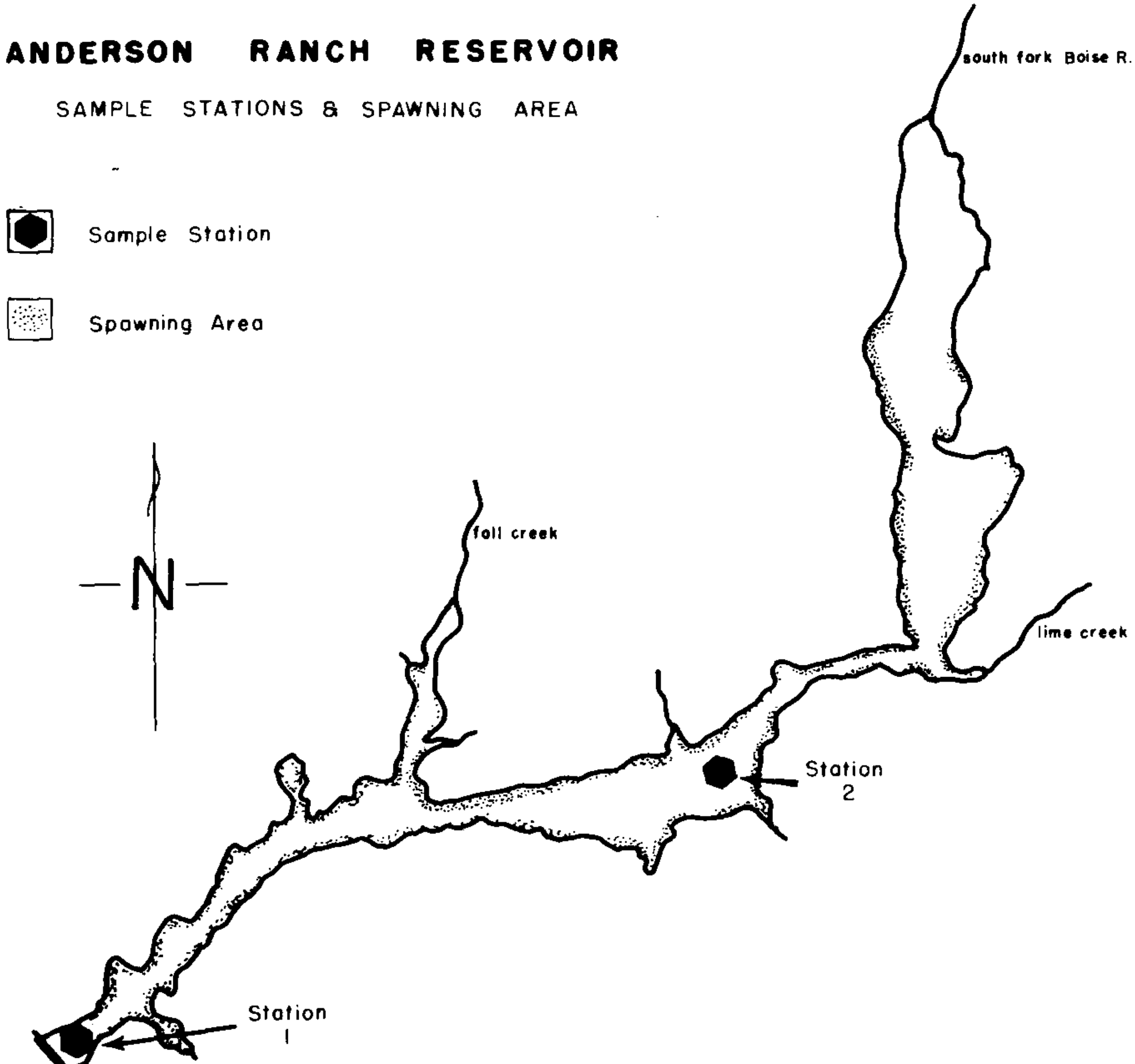

Figure 1. Map of sample stations and squawfish spawning areas Anderson Ranch Reservoir.

each station plankton samples, temperature, and dissolved oxygen data were collected at various depths.

A three liter Kemmerer sampler was used for all zooplankton sampling. Two samples each were taken at 5 foot intervals from the surface to a depth of 40 feet. From 40 feet to 70 feet, samples were taken at 10 feet intervals. The entire contents of the three liter samples were strained through a Wisconsin plankton net rigged with number 20 bolting cloth. Plankton were measured volumetrically to determine the standing crop, fluctuations in the standing crop, and depth distribution patterns.

FINDINGS:

Cladocera comprise the bulk of the zooplankters sampled in the reservoir. Daphnia spp. are present in both quantity and quality throughout most of the growing season (Figures 2 and 3). A high of 55 organisms per liter was collected in May at a depth of 20 feet.

Copepods were present in some quantity in May and July. A high of 70 organisms per liter was collected in May and mid-July (Figures 4 and 5). Data collected at both stations in June were inadvertently destroyed in a field accident, hence no graphical illustration of zooplankters in this month.

Dissolved oxygen data collected from various depths at two stations in the reservoir indicate an ample abundance of well oxygenated water throughout the reservoir during the summer months. Dissolved oxygen levels in Anderson Ranch Reservoir ranged from a mid-summer low of 8.5 ppm to a spring and fall high of 12.6 ppm and 10.5 ppm, respectively. Dissolved oxygen concentrations at depths of 200 feet varied from 8-10 ppm and remained fairly constant at these levels throughout the months of June, July, and August.

Temperature data collected from two stations indicated relatively homothermos conditions in May and October (Figures 6 and 7). Stratification was present during the summer months.

Surface water temperatures varied from 53 degrees to 75 degrees Fahrenheit and averaged 66 degrees Fahrenheit at both stations. The temperatures of the bottom waters varied from 39-48 degrees Fahrenheit. The 70 degree isotherm, when present, remained within 25 feet of the water surface at both stations during the summer. The isotherms of 65, 60, 50, and 45 degrees Fahrenheit were found at greater depths as the summer progressed. Since isotherms were found at greater depths as the summer progressed, fish which occupy waters of a limited temperature range such as trout and kokanee, would also have to move deeper later in the summer.

LIFE HISTORY STUDIES

Relative abundance and vertical distribution of game and nongame species was to be determined by the use of vertical and horizontal gill nets.

The use of vertical gill nets had to be abandoned. A factory error in net construction made use of the nets impossible. The field season had passed before the nets were returned in a usable state.

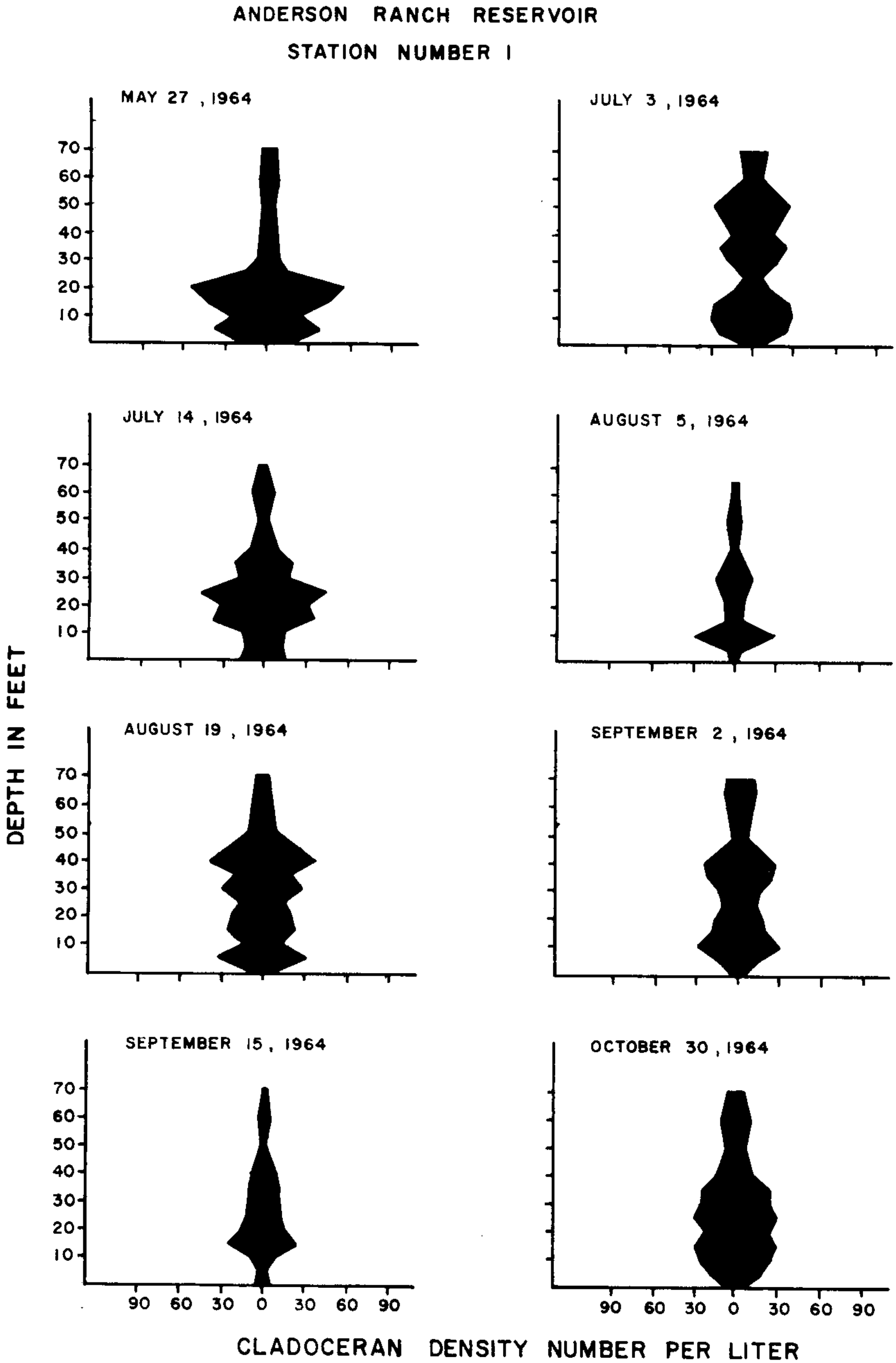

Figure 2. Cladoceran density in number per liter at station No. 1 Anderson Ranch Reservoir.

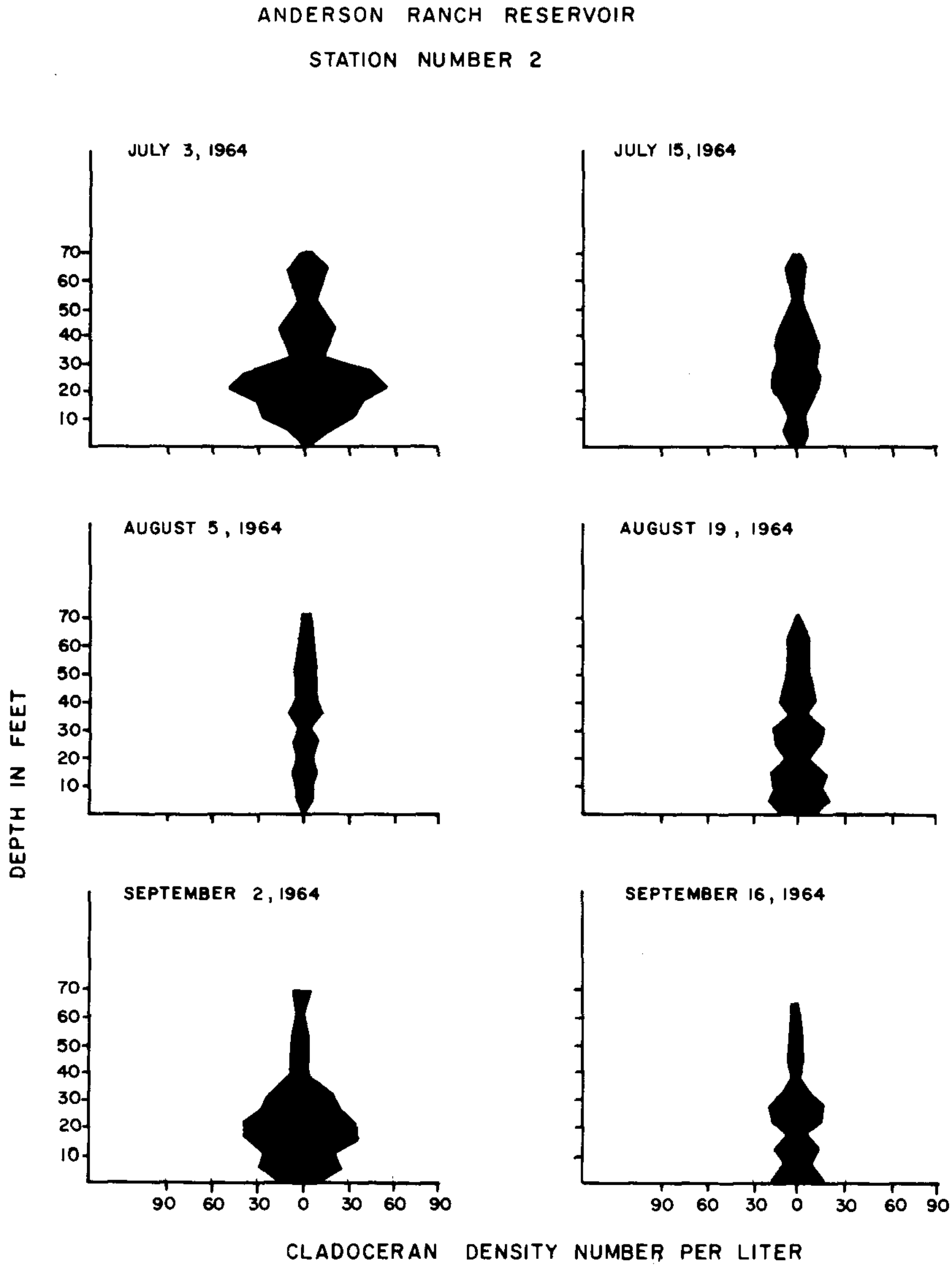

Figure 3. Cladoceran density in number per liter at station No. 2 Anderson Ranch Reservoir.

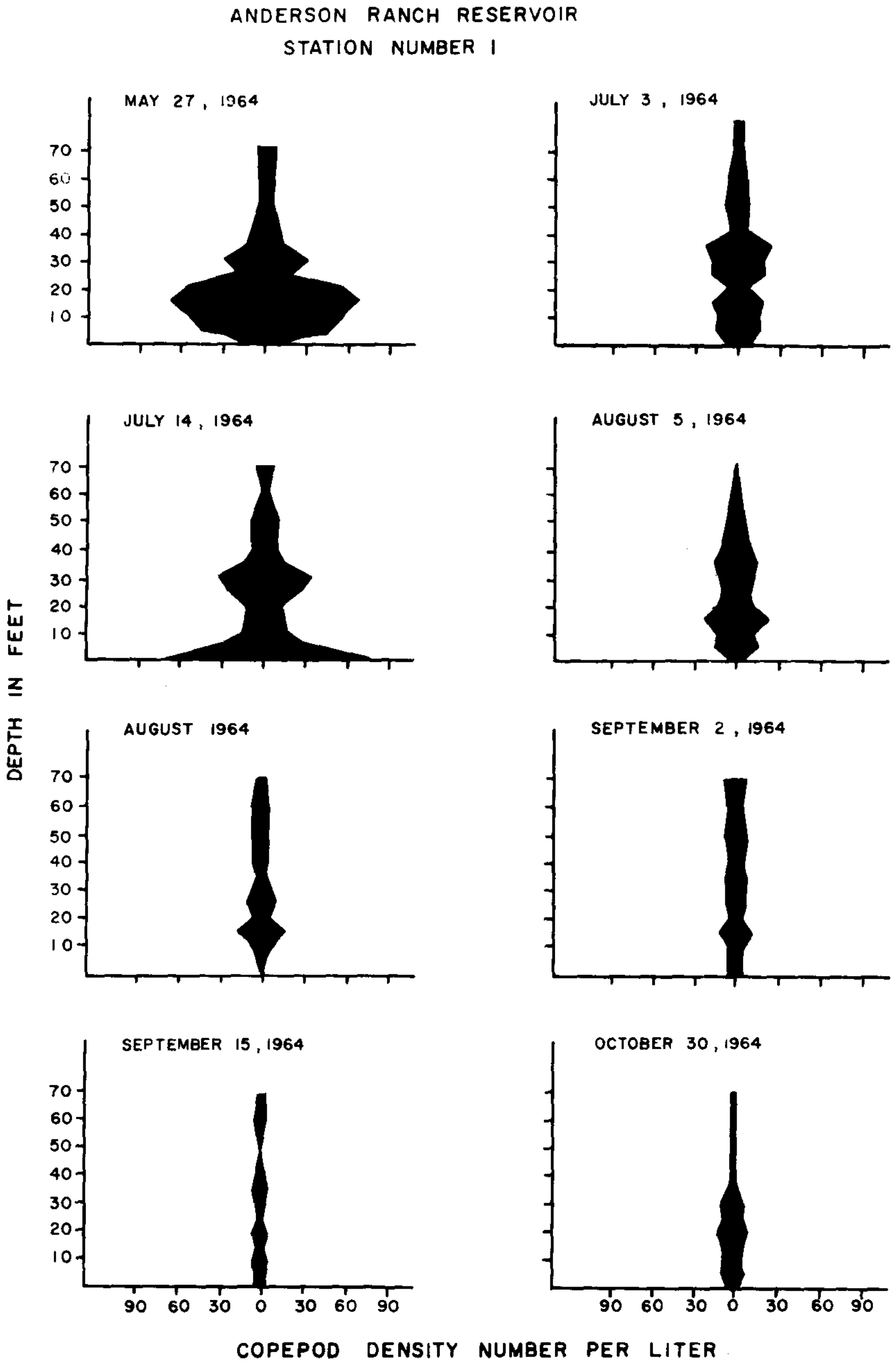

Figure 4. Copepod density in number per liter at station No. 1 Anderson Ranch Reservoir.

ANDERSON RANCH RESERVOIR
STATION NUMBER 2

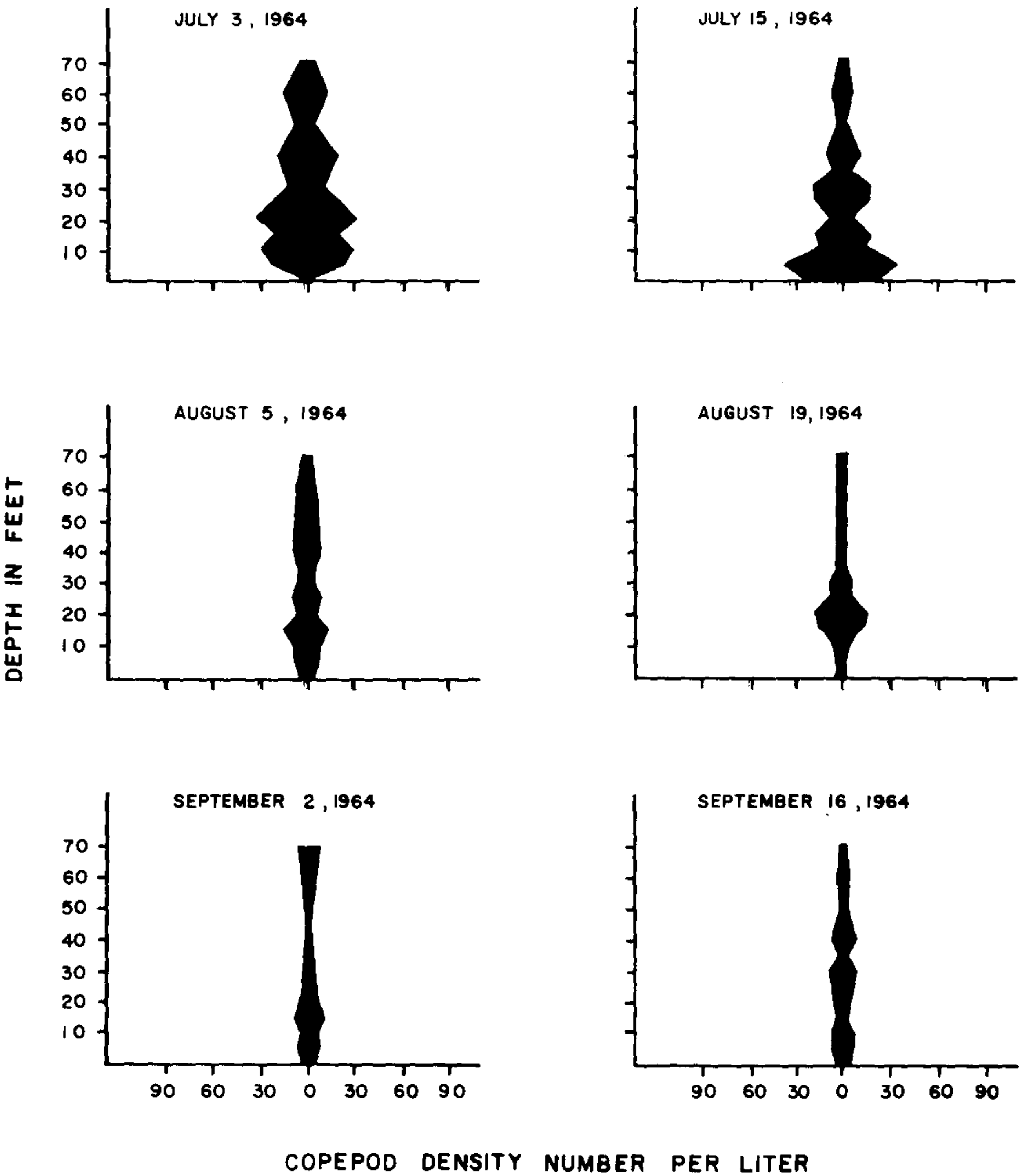

Figure 5. Copepod density in number per liter at station No. 2 Anderson Ranch Reservoir.

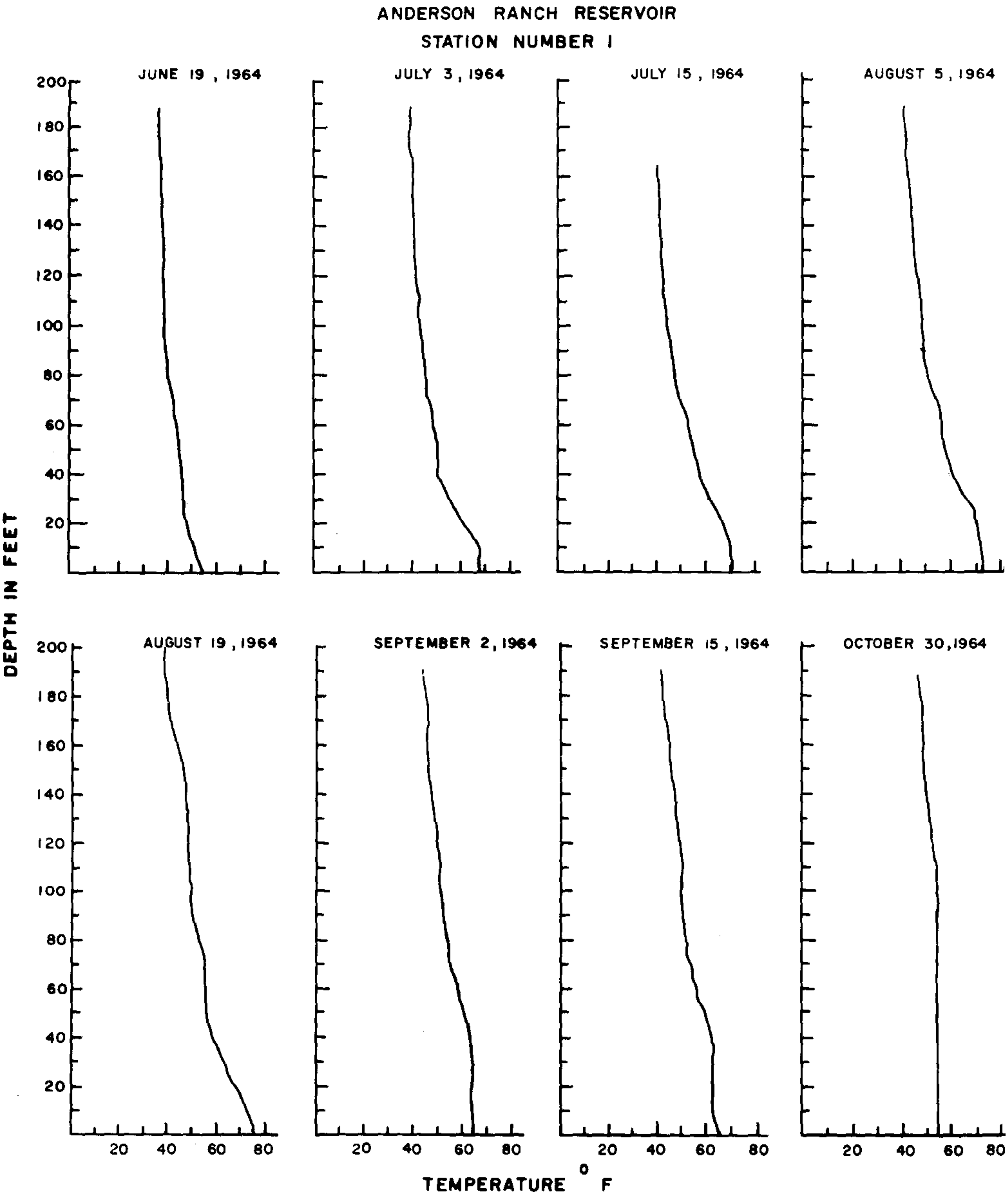

Figure 6. Temperature in degrees Fahrenheit at station No. 1 Anderson Ranch Reservoir.

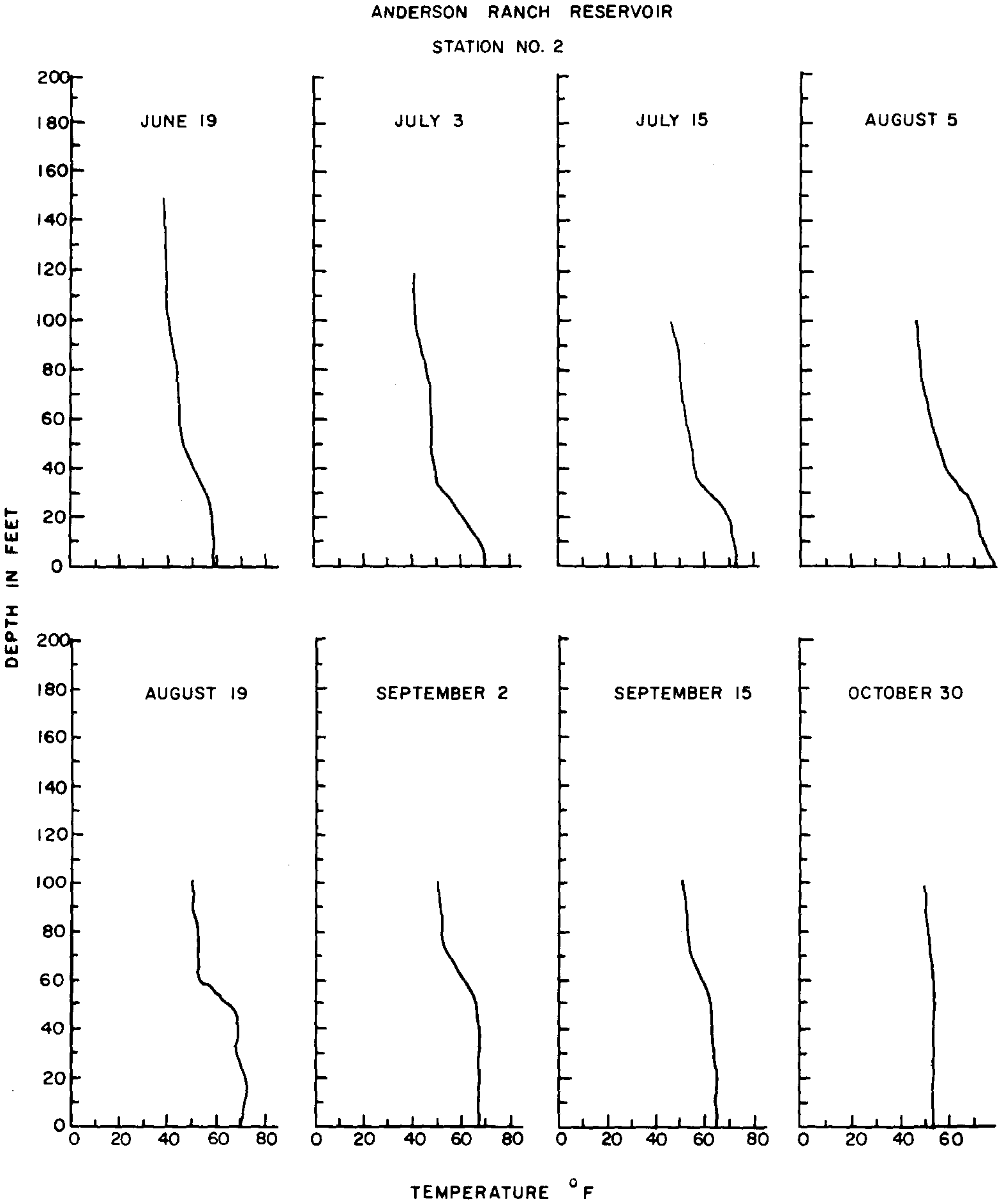

Figure 7. Temperature in degrees Fahrenheit at station No. 2 Anderson Ranch Reservoir.

Gill netting, creel census, and SCUBA observations show the following species present in the reservoir:

Rainbow trout	Course-scaled sucker
Dolly Varden	Fine-scaled sucker
Kokanee	Sqawfish
Yellow perch	Chislemouth chub
Whitefish	Redside shinner

Although no kokanee were collected, they are known to be in the reservoir (Gebhards' annual report F-51-R-1, 1964).

Horizontal experimental gill net sets were made as often as time permitted throughout all areas of the reservoir. Gill net catches of fish throughout the summer was composed of 51 percent squawfish, 27 percent sucker spp., 5 percent chislemouth chub, 13 percent yellow perch, and 4 percent rainbow trout.

Observations on spawning habits of species within the reservoir were very limited prior to mid-June. Of primary interest was the spawning habits and activities of squawfish along the shoreline. Periodic SCUBA checks of the reservoir shoreline revealed little or no squawfish concentrations along shore areas in early June. By mid-June, larger concentrations of squawfish were observed swimming in the vicinity of and adjacent to wave-washed rubble areas along the reservoir shoreline.

Actual spawning was observed on June 21. Surface water temperature was 64 degrees Fahrenheit. With the aid of SCUBA, squawfish spawning in shoreline areas was confirmed. Although squawfish are concentrated and active in the spawning areas all day, egg deposition and fertilization appears to be most prevalent in early morning hours on clear calm days. From an underwater observation point, squawfish were observed to move back and forth adjacent to the area utilized as a spawning bed at depths of 15 to 25 feet. The water temperature is one or more degrees cooler at this depth. Females then dart from the school up to the warmer shallower rubble area, swim in a dance-like, sideways motion, and broadcast their eggs in the presence of many male fish and the eggs are then fertilized. The eggs drift down into the cracks and crevices of the rubble to incubate, aerated by wave and shoreline water current action. Eggs were observed scattered in granitic type rubble within 3 to 4 feet of the water surface in all areas of large shoreline concentrations of squawfish. Suckers were most active in the squawfish spawning areas during the peak spawning period and were observed feeding on freshly deposited squawfish spawn. No suckers were observed spawning. Spear guns were used to collect both squawfish and suckers. All suckers collected were spawned out. Stomach analysis revealed suckers had eaten squawfish eggs. Squawfish eggs hatched in 10 to 12 days. Large numbers of sac-fry were observed in the immediate shoreline surface area.

All observed squawfish spawning areas were marked by painting large rocks adjacent to the spawning area with fluorescent red spray paint (Figure 1). Follow-up SCUBA observations in these areas showed some limited spawning activity through the middle of July.

Hoop net traps set in Lime Creek, a tributary stream, showed little movement of squawfish out of the reservoir. It appears that most of the squawfish population in the reservoir spawns in the reservoir.

No kokanee and very few rainbow trout or other game fish were collected during the study period. Although several hundred squawfish were collected in gill nets, stomach analyses of these fish proved fruitless as most of the stomachs were empty. Limited examinations of both sucker and squawfish stomachs captured by spear gun throughout the summer indicated that both of these fish fed heavily on zooplankton.

Squawfish, chiselmouth, and suckers were observed feeding on the surface in large schools over a one-half mile area in the upper half of the reservoir on two different occasions. The activity was first concluded to be that of kokanee feeding on zooplankters. However, an immediate check with SCUBA gear proved this activity to be that of squawfish, chislemouth and suckers. All three species fed in much the same manner as carp cropping on phytoplankton. Surface water conditions were slick calm. Many plankters appeared to have been trapped in the surface tension of the water. Suckers fed on the trapped plankton with ease.

Temperature, dissolved oxygen, and zooplankton abundance data indicated that reservoir environment was suitable for the production of kokanee salmon. An attempt to start a cycle of kokanee was made in late November. Early fall-run kokanee eggs (696,000) were transferred from Moose Creek in eastern Idaho to Eagle Hatchery. These eggs were hatched and held to the swim-up fry stage and released in the South Fork Boise River about six miles upstream from the reservoir.

DISCUSSION:

Temperature, dissolved oxygen and zooplankton abundance data indicated that the reservoir environment was suitable for the production of salmonids.

The fact that gill net catch data revealed 83 percent of the fish caught were nongame fish species indicates that these fish dominate the reservoir fish population. Of these nongame fish, squawfish (Ptychocheilus oregonensis) appear to be the primary problem species in the reservoir. It competes for food and space and is known to prey on more desirable game fish, especially rainbow trout and kokanee.

In many lowland reservoirs in southwestern Idaho the squawfish has been increasing in abundance because: it adapts to most aquatic environments, including streams and reservoirs; it thrives in new impoundments and is favored by selective fishing for other more desirable fish.

Since complete eradication of squawfish is not practical or economically feasible in large reservoirs and lakes, control methods are desirable which will reduce the numbers of this large cyprinid. The majority of squawfish spawning occurs over wave-washed rubble along the reservoir shoreline. Possible control of the squawfish population could be done by chemical treatment of shoreline spawning areas. SCUBA observations in spawning areas revealed large concentrations of newly emerged fry. It is believed that because of the limited swimming ability of these fry, and concentration of the fry in shallow shoreline areas, large numbers could be killed by chemical treatment.

Spawning begins in early June and peaks sometime in late June. On the spot SCUBA observations of spawning areas could be made throughout the spawning time period to determine peak fry emergence periods. It is during these periods that chemical treatment could be initiated. Continued yearly treatments could theoretically reduce the spawning age group populations and thus in time, control squawfish production.

Another possible control measure would be to manipulate the surface waters of the reservoir through draw down during critical spawning periods, thus exposing the eggs. Because of the relatively long period over which spawning occurs, and the fact that June is a critical run-off period and the reservoir is filling, only an unusual water year would allow this type of control.

Sport fishing on the reservoir is at a minimum because of the predominance of nongame fish present. Yellow perch is the predominant specie sought after by anglers during the summer months. Hatchery rainbow trout comprised 85 percent of the trout catch (Gebhards, Creel Census Summary for Fisheries Management Area V, 1964). Most of the trout are taken by trolling in early spring or late fall. Very few are harvested during the mid-summer months.

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May, 1966

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